



U.S.S.N. 09/700,139
Appeal Brief

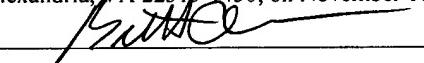
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Bachmann et al.
Serial No.: 09/700,139
Filing Date: December 15, 2000
Title: *Panel Loudspeaker*

Examiner: Michalski, Justin I.
Group Art Unit: 2644
Confirmation No.: 1980
Attorney Docket No.: HAS-008.01

CERTIFICATE OF MAILING

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Brett Clemens

APPEAL BRIEF

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Appellants submit this brief in support of their appeal initiated by the Notice of Appeal filed on September 23, 2004. The Commissioner is authorized to charge the fee required under 37 C.F.R. § 41.20(b)(2) to Deposit Account No. 06-1448.

(1) Real Party in Interest

The real party in interest in this appeal is Harman Audio Electronic Systems GmbH, a German corporation having executive offices at Schlesische Straße 135, 94315 Straubing, Germany. Harman Audio Electronic Systems GmbH is the Assignee of the

entire right, title, and interest in the present application by virtue of an assignment from the inventors. This assignment was recorded by the U.S. Patent and Trademark Office on December 15, 2000 at Reel 011423 and Frame 0185.

(2) Related Appeals and Interferences

There are no other appeals or interferences known to Appellants, their Attorneys/Agents, or the Assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the present appeal.

(3) Status of Claims

The application has a total of nine claims, 1-9. Of these, claims 1-6 and 8-9 are pending, and claim 7 is cancelled. Claims 1-4, 6, and 8-9 stand finally rejected. Claim 5 stands objected to for depending from a rejected claim but would be allowable if rewritten in independent form. Claims 1-4, 6, and 8-9 are on appeal.

(4) Status of Amendments

There are no unentered amendments in the application.

(5) Summary of Claimed Subject Matter

The subject matter of claim 1 is a panel loudspeaker. The claimed loudspeaker includes a sound radiating panel that is mounted under mechanical tension to a periphery (such as a wall) by a connecting element. Figures 1 and 3 show an exemplary panel loudspeaker in top and side view, respectively.

Panel 11 includes a core layer 13 and at least one cover layer 14.o and/or 14.u. The panel is so formed that the cover layer is under mechanical tension (indicated by arrow P4 in Figure 3) when it is connected with the core layer. *See* specification, page 6, lines 10-11

and 22-23.¹ The panel is placed in an opening 15 of a periphery 12 so that it is surrounded by the periphery with a lateral gap A therebetween. *See* specification, page 6, lines 2-3. A connecting element 17 is positioned to span the gap and contact both the periphery and the panel 11. *See* specification, page 6, lines 8-9. The connecting element is stretched so that it is under mechanical tension and then affixed to the periphery and the panel. *See* specification, page 6, lines 11-16.

In some embodiments (an example of which is depicted in Figure 2), the periphery for one panel 11' is formed in part by another panel 11''. *See* specification, page 7, lines 1-3. In some embodiments, the connecting element is formed by a cover layer that extends from the sound panel to the periphery. *See* specification, page 3, lines 15-18.

(6) Grounds of Rejection to be Reviewed on Appeal

Appellants submit two grounds of rejection for review:

- A. that the subject matter of claims 1-4 and 8-9 is anticipated under 35 U.S.C. § 102(e) by U.S. Patent No. 6,003,766 to Azima et al. ("Azima"); and
- B. that the subject matter of claim 6 is obvious under 35 U.S.C. § 103(a) in view of Azima.

(7) Argument

- A. Claims 1-4 and 8-9 are novel over Azima.

- (1) Claims 1, 3, 8, and 9

The Examiner rejected claims 1-4, 8, and 9 under 35 U.S.C. § 102(e) as defining subject matter that U.S. Patent No. 6,003,766 to Azima et al. ("Azima") anticipates. The

¹ Citations to the specification refer to the English translation of the original German language specification, as amended by the Preliminary Amendment dated Nov. 9, 2000.

Examiner argued that Azima's Figure 2a embodiment anticipates the subject matter of claim 1 because it depicts a panel (2) having a core layer (22), a cover layer (21), a periphery (1) that surrounds the panel with a lateral gap (between joints 20 and 20), and a connecting element (20) connecting the panel with the periphery. *See* Final Office Action dated Mar. 23, 2004, page 2, second paragraph. The Examiner further argued that the connecting element (joint 20) and the cover layer (21) are inherently under mechanical tension.

Following this rejection, Appellants' undersigned representative conducted a telephone interview with Examiner Minsun Harvey. During the interview, Appellants' representative pointed out that Azima is ambiguous as to whether its connecting element is under tension, compression, or any other force. The Examiner agreed that the reference was ambiguous but stated that Azima's connecting element and cover layer inherently must be under *some* force, and that the claim term "tension" is broad enough to mean whatever force that might be. Appellants' representative argued in response that the term "tension" is recognized in physics to refer to "forces acting to pull an object apart," not to just any force, and that Azima therefore does not describe the claimed tension.

In the Response after the Final Office Action, Appellants further responded to the Examiner's position by offering evidence of the meaning of the term "tension" to one of ordinary skill in the art. In particular, Appellants offered an excerpt from a physics textbook describing tension and characterizing it as the opposite of compression. Appellants also offered a copy of the Oxford English Dictionary entry on tension as understood in the physics sense, which was similar to that described in the physics text. In response to these arguments, however, Examiner Michalski reiterated Examiner Harvey's interpretation of the term "tension" and maintained the rejection.

Appellants urge the Office to reconsider this position because it has adopted an unreasonably broad interpretation of the term "tension."

During examination, the claim terms must be given their "broadest reasonable interpretation consistent with the specification." *In re Hyatt*, 211 F.3d 1367, 1372, 54

USPQ2d 1664, 1667 (Fed.Cir. 2000). This “broadest reasonable interpretation” must also be consistent with the interpretation understood by one of ordinary skill in the art. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed.Cir. 1997) (“[T]he PTO applies to verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art”); *cf. Brookhill-Wilk 1, LLC v. Intuitive Surgical, Inc.*, 334 F.3d 1294, 1298, 67 USPQ2d 1132, 1136 (Fed.Cir. 2003) (“In the absence of an express intent to impart a novel meaning to the claim terms, the words are presumed to take on the ordinary and customary meanings attributed to them by those of ordinary skill in the art.”).

In accordance with this clear law, Appellants have supplied the Office with ample evidence from a physics textbook and a renowned dictionary that the term “tension” is understood by those of ordinary skill in physics to mean “forces acting to pull an object apart.” Although there are several alternative meanings for “tension” depending on its context (such as “emotional anxiety” in psychology, “gas partial pressure” in medicine, and “electrical potential” in electronics), it is clear that physics is the appropriate context here, because the claim recites “*mechanical tension*” (emphasis added). Other interpretations of the term “tension” are precluded by this qualification. And “tension” has a clear and undisputed meaning in physics, as exemplified by the discussion of it in Artley’s *Fields and Configurations* textbook,² and by the definition in the Compact Oxford English Dictionary (Second Edition, Oxford: Clarendon Press, 1991):

a constrained condition of the particles of a body when subjected to forces acting *in opposite directions* away from each other (usually along the body’s greatest length), thus tending to draw them apart, balanced by forces of cohesion holding them together; the force or combination of forces acting in this way, [especially] as a measurable quantity. (*The opposite of compression or pressure*). (emphasis added).³

² A copy of the relevant page of this textbook was attached to Appellants’ Response after Final Office Action, filed June 23, 2004. Another copy is attached hereto at Tab A.

³ A copy of the relevant page of the Oxford English Dictionary was attached to Appellants’ Response after Final Office Action, filed June 23, 2004. Another copy is attached hereto at Tab B.

For these reasons, Appellants assert that the Examiner has given “tension” an unreasonably broad interpretation in declaring it to mean “any force” and respectfully ask that the rejection of claims 1, 3, 8, and 9, based on this incorrect interpretation, be reversed.

(2) Claim 2

Appellants incorporate herein all of the arguments presented above in favor of patentability with respect to claims 1, 3, 8, and 9. With particular reference to claim 2, Appellants point out that Azima does not disclose that “at least one of the cover layers of the respective sound radiating panel extends to the periphery.” The Examiner stated in the Final Office Action that Azima’s Figure 2a shows cover layer 21 extending to the periphery 1. Appellants do not understand the Examiner’s assertion, because Figure 2a distinctly shows that suspension 3 is interposed between the cover and the periphery. It simply cannot be said that Azima’s cover layers extend to its periphery. For this reason, Appellants respectfully assert that claim 2 is patentable over Azima in its own right and request reversal of the rejection.

(3) Claim 4

Appellants incorporate herein all of the arguments presented above in favor of patentability with respect to claims 1, 3, 8, and 9. With particular reference to claim 4, Appellants point out that Azima does not disclose that “the periphery is formed by at least one additional panel.” The Examiner stated in the Final Office Action that Azima’s Figure 2a shows an additional panel that is represented by reference number 1. Appellants disagree with the Examiner’s interpretation of Azima because reference element 1 is used by Azima exclusively to refer to a frame. See Azima’s col. 2, line 57, col. 3, lines 13-14, and col. 5, line 34, which are the only references to element 1. Azima never teaches or suggests that element 1 could be another panel, and Azima provides no drawing or description of one panel forming part of the periphery for another panel. For this reason, Appellants respectfully assert that claim 4 is patentable over Azima in its own right and request reversal of the rejection.

B. Claim 6 is nonobvious over Azima.

Appellants incorporate the arguments presented above in support of the patentability of claim 1. Claim 6 depends from patentable claim 1 and is therefore itself also patentable.

(8) Claims Appendix

See pages 8-9 of this Appeal Brief.

(9) Evidence Appendix

See page 10 of this Appeal Brief.

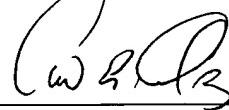
(10) Related Proceedings Appendix

See page 11 of this Appeal Brief.

CONCLUSION

For the reasons given above, Appellants ask that the rejections of claims 1-4, 6, and 8-9 be reversed.

Respectfully submitted,
FOLEY HOAG LLP



Scott E. Kamholz
Reg. No. 48,543
Agent for Appellants
acting under 37 C.F.R. § 1.34

Date: November 16, 2004
Foley Hoag LLP
155 Seaport Blvd.
Boston, MA 02210-2600
Telephone: 617-832-1230
Facsimile: 617-832-7000

(8) Claims Appendix

1. Panel loudspeaker comprising
 - at least one sound radiating panel having a core layer and at least one cover layer connected with the core layer,
 - a periphery that surrounds the at least one sound radiating panel with a lateral gap, and
 - at least one connecting element that connects the at least one sound radiating panel with the periphery,

wherein the at least one connecting element is under mechanical tension when connected with the periphery, and

wherein regions of the at least one cover layer that are connected with the core layer are also under mechanical tension.
2. Panel loudspeaker according to claim 1,

wherein the at least one connecting element is formed by the at least one cover layer of respective sound radiating panel in that at least one of the cover layers of the respective sound radiating panel extends to the periphery.
3. Panel loudspeaker according to claim 1, wherein the periphery is formed by a frame.
4. Panel loudspeaker according to claim 1, wherein the periphery is formed by at least one additional panel.
5. (not on appeal)

6. Panel loudspeaker according to claim 1, wherein the sound radiating panel is a bass panel adapted to reproduce low-frequency sound.
7. (canceled)
8. Panel loudspeaker according to claim 1, wherein at least one of the core layer and the at least one connecting element is provided with a damping element.
9. Panel loudspeaker according to claim 8, wherein a mechanical tension in the at least one connecting element is different from the mechanical tension in the at least one tensioned cover layer.

(9) Evidence Appendix

The following items were submitted as exhibits with Appellants' Response After Final Office Action submitted on June 23, 2004 in response to the Final Office Action mailed March 23, 2004. The Examiner made no objection to their entry. Appellants rely on these exhibits in their appeal, and copies are attached at respectively-lettered tabs.

- A. JOHN ARTLEY, FIELDS AND CONFIGURATIONS 276 (Holt, Rinehart and Winston, Inc. 1965).
- B. THE COMPACT OXFORD ENGLISH DICTIONARY 782 (SECOND EDITION) (Clarendon Press 1991).

(10) Related Proceedings Appendix

none



Fields and Configurations

JOHN ARTLEY

Duke University

HOLT, RINEHART AND WINSTON, INC.

New York, Chicago, San Francisco, Toronto, London

P

This book is intended for the engineer, the mathematician, the physicist, and the student of mechanics. It combines the results of stationary mechanics with the results of the response of structures to moving loads. The book is divided into two parts: Part I deals with the response of linear systems to stationary loads, and Part II deals with the response of linear systems to moving loads.

It is clear that the material covered in this book is not new. It is a compilation of the results of many years of research in mechanics, physics, and vector analysis. The work that has been done in this field reveals the following:

The first part of the book deals with the application of mathematics to mechanics. It covers the kinds of problems that are encountered in applied mechanics, such as the assumptions made in the theory of elasticity, the methods used in solving problems, and the applications of the theory of elasticity to practical problems.

*Copyright © 1965 by Holt, Rinehart and Winston, Inc.
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20528-0115
Printed in the United States of America*

and the density of the material is 3×10^3 kilograms per (meter)³. The force of gravity is acting on the center of mass of the top.

Deformation of solid bodies

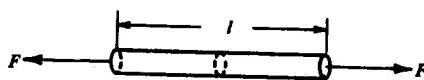
The treatment of solid bodies as rigid bodies is useful in the description of the motion of the bodies. However, when solids are considered more carefully it becomes apparent that they are not rigid but deform when stress is applied to them. When too great a stress is applied to solids the deformation is permanent. However, at sufficiently small levels of stress many materials are deformed in a reversible manner and return to their original dimensions. In order to discuss the manner in which stresses and strains are described in rather simple configurations it is desirable to define stress and strain, first for simple one-dimensional situations and then for the more complete three-dimensional situation.

Tension and compression

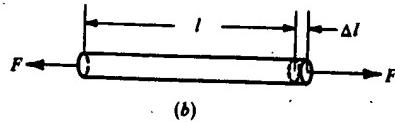
Stress in tension and compression may be defined by referring to Figure 6-11 in which a cylindrical rod is subjected to forces along its axis. By definition, the stress σ acting in the rod is the force per unit area which may be written:

$$\sigma = \frac{F}{S} \quad (6-2-19)$$

The area S is the cross-sectional area over which the force F is uniformly distributed. The stress is said to be a tensional stress when the forces F acting on opposite ends of the rod are as shown in Figure 6-11. When the forces are in the opposite sense, tending to compress the rod, the stress is said to be a compressional stress. A plus sign is normally associated with tensional stress and a minus sign with compressional stress. The stress in a material is an indication of the strength or intensity of the force field within the material. The components of stress in a three-dimensional situation are components of a second rank tensor. This matter is discussed later in this chapter.

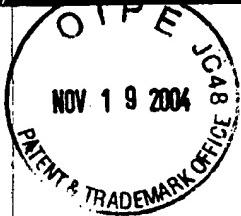


(a)



(b)

Fig. 6-11. Diagram to indicate linear stress and strain.



THE COMPACT OXFORD ENGLISH DICTIONARY

SECOND EDITION

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TENTH

TENSIFY

782

strength. 1676 *Phil. Trans.* XI. 707 What is the matter, structure, tenacity, tensibility, .. and various use of Fibres?

tensify (*tensa*), v. rare. [f. L. *tens-us*, TENSE a. + -*(I)FY.*] *trans.* To make tense.

1869 BUSHNELL *Wom. Suffrage* iii. 50 Fibred, tensified and toned for action. 1932 V. WOOLF *Common Reader* and Ser. 145 That strain of... passion did.. not tensify the quiet of the country morning.

tensile ('tensil, -ail), a. Also 7 *tensil*. [ad. mod. L. *tensilis* capable of stretching, f. *tens-*, ppl. stem of *tendere* to stretch; see -IL, -ILE.]

1. Capable of being stretched; susceptible of extension; ductile.

1656 BACON *Sylva* §845 All bodies ductile, and tensile, that will be drawn into wires. 1665 J. SMITH *Old Age* (1676) 173 The dry, solid, tensile, hard, and crusty parts of the body. 1794 Mrs. PROZzi *Symon*, I. 175, I have omitted *tensile* on the list, .. only because 'tis out of use in talk. 1874 TAFT *Adv. Phys.* Sc. xii. (1874) 313 It [a soap-bubble] has two tensile surfaces with a layer of water between them.

2. Of, or the nature of, or pertaining to tension; exercising or sustaining tension. *spec.* as *tensile test* (*Engin.*), a test for determining the tensile strength of a sample of material (usu. metal); so *tensile testing* (also *attrib.*).

1841 *Civil Engin. & Arch. Jnl.* IV. 31/2 Cast iron... will bear a very considerable tensile strain. 1857 *WHEWELL Hist. Indust. Sci.* (ed. 3) II. 444 Wrought iron yields to compressive somewhat more easily than to tensile force. 1866 JOYNTON *Metals* go It possesses a tensile strength double that of good malleable iron. 1877 KNIGHT *Dict. Mech.* III. 253/0 In the hydraulic tensile testing-machine, the specimen is held by the two clamps. 1883 *Jnl. Iron & Steel Inst.* 98 (*heading*) Results of tensile tests made at University College, London. 1898 ALBUTT'S *Syst. Med.* V. 936 This tensile strain is due to the stress of the hypertrophied left ventricle. 1923 GLAZEBROOK *Dict. Appl. Physic* V. 53/1 Two types of testing machine are in use for the tensile testing of fabric specimens. 1933 D. J. O. BRANDT *Manuf. Iron & Steel* 362 Fig. 203 shows a tensile testing machine and the method of setting up the test piece. 1973 J. G. TWEDDLE *Materials Technol.* I. iv. 78 (*caption*) A tensile test piece.

3. Of a musical instrument: Producing sounds from stretched strings. *rare*-⁰.

In recent Dicts.

Hence 'tensiled a. (*rare*-0), 'made tensile; rendered capable of tension' (*Webster* 1864); 'tensilely adv., in relation to tension; ten'sility, tensile condition or quality.'

1891 Standard 28 Jan. Small forgings are generally tensilely stronger proportionately than large ones. 1859 H. MONT *Immort. Soul* II. x. (1662) 102 The libration or reciprocation of the spirit in the tensility of the muscles. 1910 *Daily News* 14 Apr. 6 A tensility which almost doubles when the metal is wrought and drawn.

tensimeter (ten'simetro(r)). [f. *TENSI(ON sb. + -METER)*.] An instrument for measuring vapour pressure.

1907 *Jnl. Amer. Chem. Soc.* XXIX. 1055 The hygrometer used above may conveniently serve the purpose of a tensimeter. 1946 J. R. PARTINGTON *Gen. & Inorg. Chem.* iii. 54 The dissociation pressure of a salt hydrate is measured in a tensimeter.

tensiometer (ten'simetro(r)). [f. *TENSI(ON sb. + -OMETER)*.] 1. a. An instrument for measuring the surface tension of a liquid. b. One for measuring the tension of soil water.

1922 *Jnl. Expt. Med.* XXXV. 576 The tensiometer was used with an accurately calibrated platinum-iridium ring... and is reliable to ± 0.1 dyne. 1936 RICHARD & GARDNER in *Jnl. Amer. Soc. Agronomy* XXVIII. 352 Rogers... lacking a more suitable name, has called the combination a soil moisture meter. In the interest of brevity and unambiguity, the name tensiometer is here used. 1973 *McGraw-Hill Yearb. Sci. & Technol.* 38/1 Tensiometers placed in the active root zone and near the bottom of the root zone.. provide information that permits control of deep percolation in irrigated soil. 1975 YONO & WARKENTIN *Soil Properties & Behavior* iv. 120 Tensiometers are widely used to indicate when irrigation is required.

2. An instrument for measuring the tension in yarn, a rope, etc.

1947 *Textile Research Jnl.* Jan. 27/1 The thread then passes to a tensimeter, .. which instrument feeds voltage proportional to the thread tension into a.. chart recorder. 1953 *Electronic Engin.* XXIV. 53 The most common instrument for measuring yarn tension is the pocket-size dial tensiometer. 1968 A. WELCH *Bk. of Airports* vi. 98/2 The tensiometer is important, so that the canopy will never be overloaded by the car being driven too fast in strong winds.

Hence *tensio'metric a.*, *tensio'metry*.

1965 *New Scientist* 18 Nov. 497/1 The rocks are simulated by microscopic glass balls and polymers... They claim that these models enable reliable forecasts of what will happen to the springs if this or that method of mining is adopted. Tensiometry, .. and ultrasound measurements play an important role in this work. 1968 *McGraw-Hill Yearb. Sci. & Technol.* 35/1 A tensiometric method utilizes a porous cup filled with water connected by a tube to a vacuum indicator. This approach measures the capillary potential or suction of soil water. 1979 *Acta Protozoologica* XVIII. 64 Two radial measurements by tensiometry.

tension ('tenson), sb. Also 7-8 *tention*: [prob. a. F. *tension* (a 1530 in *Godef. Compl.*), ad. late L. *tension-em*, n. of action f. *tendere* to stretch (pa-

pple. *tens-us*, *tent-us*). But the Eng. word may have been direct from 16th c. medical Latin.

With *tension* agree *distrision*, *extension*, *pretension*; the variant *tention* agrees with *attention*, *contention*, *intention*.

The action of stretching or condition of being stretched: in various senses.

1. a. *Physiol.* and *Path.* The condition, in any part of the body, of being stretched or strained; a sensation indicating or suggesting this; a feeling of tightness. (The earliest use in English.)

1513 *Eccles. Cast. Helike* (1541) 59 b. There is felt within the bulke of a man.. a weyghtynesse with tension, or thrusting outwarde. 1603 HOLLAND *Plaster's Man.* 656 The veines.. upon the tension and commotion wherof, drunkennesse doth proceed. 1619 *Crooke Body of Man* 230 The first is a stretching or Tension not without strife or contention. 1707 F. FULLER *Med. Gymn.* (1705) 30 What I mean by this Tension or Tone of the Parts. 1726 BRADLEY'S *Phar. Diet.* s.v. *Vomiting*. The tension of the Hypocondriacal Sight. 1758 BURKE *Sadd.* & C. IV. iii. An unnatural tension of the nerves. 1855 H. SPENCER *Psychol.* ii. xi. §55, 213 A correspondingly strong sensation or muscular tension.

b. *Bot.* Applied to a strain or pressure in the cells or tissues of plants arising from changes taking place in the course of growth.

1873 BENNETT & Dyer *Sack's Bot.* 708 Causes of the condition of Tension in Plants. The elasticity of the organised parts of plants results in tension chiefly from the operation of three causes. *Ibd.* 713 In a turbid cell, the cell-wall is.. in a state of negative, the contents in a state of positive tension. *Ibd.* 720 It is only when the epidermis is becoming cuticularised and the walls of the bast-cells are beginning to thicken that the tensions become perceptible.

2. fig. A straining, or strained condition, of the mind, feelings, or nerves. a. Straining of the mental powers or faculties; severe or strenuous intellectual effort; intense application.

1763 SHENSTONE *Economy* i. 151 When fancy's vivid spark impels the soul 'To scorn quotidian scenes, .. what nostrum shall compose its fatal tension?' 1865 W. GIFFORD *Let.* in *Smiles Mem. J. Murray* (1861) II. xxv. 172 It is a fearful thing to break down the mind by unremitting tension. 1875 JOYNTON *Plato* (ed. 2) IV. 12 The mind cannot be always in a state of intellectual tension.

b. Nervous or emotional strain; intense suppressed excitement; strained condition of feeling or mutual relations which is for the time outwardly calm, but is likely to result in a sudden collapse, or in an outburst of anger or violent action of some kind.

1847 DISRAELI *Tenured* iv. vi. The expression.. of extreme tension.. had disappeared. 1852 Mrs. STOWE *Uncle Tom's C.* vii. As the danger decreased with the distance, the supernatural tension of the nervous system lessened. 1878 LECKY *Eng. in 18th C.* II. vii. 311 Society cannot permanently exist in a condition of extreme tension. 1885 *Lloyd Daily Post* 11 Apr. 6/7 A tension of feeling which has had no parallel since the outbreak of the Crimean war.

c. Esp. in *Psychol.* A condition of strain produced by anxiety, need, or by a sense of mental, emotional, or physical disequilibrium; also *attrib.* or *as adj.*

1884 W. JAMES in *Mind* IX. 12 The states of tension.. have as positive an influence on the discharges in determining the total condition, and consequently in deciding what the psychos shall be to which the complex neurosis corresponds. 1928 H. M. & E. R. GUTHRIE tr. JONES'S *Princ. Psychotherapy* iv. 214 Psychic tension [*it*] characterized by the degree of activation and the hierarchical degree of acts. 1936 J. RIVIERE in *FREUD's Civilization & Its Discontents* 127 The sense of guilt.. is.. the ego's appreciation of the tension between its strivings and the standards of the super-ego; and the anxiety that lies behind. 1936 ADAMS & ZENER tr. LEWIN'S *Dynamic Theory of Personality* ii. 59 A tendency may readily be observed toward immediate discharge of tension (i.e. of a state of equilibrium at the lowest possible state of tension). 1958 H. A. MURRAY in G. LINDSEY *Assessment of Human Motives* vii. 194 The concept of human nature.. is the concept of perpetually recurrent drives, or tensions.

d. The conflict created by interplay of the constituent elements of a work of art. Used esp. of poetry. (See also *quot.* 1941.)

1941 A. TATE *Reason in Madness* 7, I proposed.. the term *tension*, using the term not as a general metaphor, but as a special one, derived from lopping the prefixes off the logical terms *extension* and *intension*... The meaning of poetry is 'its tension', the full organic body of all the extension and intension that we can find in it. 1949 *Poetry* Feb. 303 *Tension*, .. the resultant effectual unity of the poem derived from the operation of such conflict-structures of wit, paradox and irony, slackness being the result of a failure in tension. 1957 N. FAYE *Anat. Crit.* 2/2 It is more likely to be the harsh, rugged, dissonant poem.. that will show in poetry the tension and the driving accentuated impetus of music. 1978 *Language* L. 83 Metrical tension can be construed as the degree of difference between underlying and derived metrical patterns.

3. a. *Physics*. A constrained condition of the particles of a body when subjected to forces acting in opposite directions away from each other (usually along the body's greatest length), thus tending to draw them apart, balanced by forces of cohesion holding them together; the force or combination of forces acting in this way, esp. as a measurable quantity. (The opposite of compression or pressure.)

TENSION

1685 BOYLE *Effects of Mot.* viii. 92 If you cut the string of a bent bow asunder, the.. extremes will fly from one another suddenly and forcibly enough to manifest that they were before in a violent state of Tension. 1762 V. KNOX *Ecc. xxii.* I. 101 The string which is constantly kept in a state of tension will vibrate on the slightest impulse. 1825 J. NICHOLSON *Operat. Mechanic* 570 The strain occasioned by pulling timber back in the direction of its length is called *tension*. 1833 KANE *Grinnell Exp.* xxviii. (1836) 232 The tension of the great field of ice over which we passed must have been enormous. It had a sensible curvature. 1833 *Metal World* No. 18. 277 A weight being placed on a beam or girder (.. resting on the support at each end..), the top is.. thrown into compression and the bottom into tension.

b. *Biol.* and *Med.* (also *Physics*) = PRESSURE

2. a.

1678 CUDWORTH *Intell. Syst.* I. v. 851 A pressure upon the optic nerve, by reason of a tension of the intermedio air, or ether. 1836 FARADAY *Exp. Res.* xxix. 200 The air.. has a certain degree of elasticity, or tension. 1844 *Civil Engin. & Arch. Jnl.* VII. 155/1 The steam.. is retained between the boiler and the plate until by its 'tension' or elasticity it is forced downwards and underneath the edge of the plate. 1863 TYNDALL *Heat* i. 59 (1870) 8 He wishes to apply the force of his steam, or of the furnace which gives tension to his steam, to this particular purpose. 1906 W. MARRIOTT *Hists to Microscop. Observers* (ed. 6) 69/1 Tension of vapour. 1907 J. H. PARSONS *Diag. Eye* ii. 18 The pressure inside the eye is called the introcular pressure, or the tension, of the eye. 1940 *Jnl. Bacteriol.* XXIX. 307 (*heading*) The effect of oxygen tension on the oxygen uptake of lake bacteria. 1972 *Brit. Med. Bull.* XXV. 53/2 The oxygen tension in the arterial blood may be somewhat lowered. 1972 A. H. HALAS *Basic Aspects of Glaucoma* 21. 97 Low tension glaucoma refers to a condition characterised by a normal intraocular pressure associated with.. glaucomatous visual field defects.

c. *transf.* The degree of tightness or looseness of the stitches in machine sewing or in knitting. Hence (also *tension-device*), a device in a sewing-machine for regulating the tightness of the stitch.

1877 KNIGHT *Dict. Mech.* s.v. By adjustment of the pressure at the tension device, the required tightness of the stitch is obtained.. There are many.. kinds of tensions, in different machines. Fig. 6309 shows the.. automatic tension.. The automatic tension-device.. is placed in the standard of the machine. 1932 D. C. MINTON *Mod. Needles* (1932) Learn how to regulate machine stitch and tension. 1933 TILLOTSON & MINTER *Compl. Knitting Bk.* ii. 21 The knitted loops, for a correct tension, should just cling lightly and closely to the reader. 1950 J. NORRIS *Knitter's Craft* i. 10 A loose tension will produce a flabby, ill-fitting garment. 1953 *Tucson (Arizona) Daily Citizen* 22 Aug. 3 (*Adv.*), Brother sewing machine Lightweight zig zag.. finger-tip touch tension. 1950 C. FREMLIN *With no Crying* x. 61 Alison was concentrating on those first vital rows of her knitting, making sure that she was getting the tension right.

4. *Electr.* The stress along lines of force in a dielectric. Formerly applied also to surface density of electric charge, and until about 1882 used vaguely as a synonym for potential, electromotive force, and mechanical force exerted by electricity; still so applied, in industrial and commercial use, in *high* and *low* tension: see *sense 5*.

1785 G. ADAMS *Essay on Electricity* (ed. 2) x. 208 The whole energy of electricity depends on its tension, or the force with which it endeavours to fly off from the electrified body. 1804 NICHOLSON'S *Jnl. Nat. Phil.* I. 137 (tr. Volta) In the one case, as well as in the other, the electric tension [*la tension électrique*] rises, during the contact, to the same point. 1833 FARADAY *Exp. Res.* (1835) I. 97 The attractions and repulsions due to the tension of ordinary electricity. 1837 BROWNSTEIN *Magnet.* 159 The sun, heating and illuminating the earth, and producing a magnetic tension. 1839 G. BIRD *Nat. Phil.* xii. 18 On their separation they are found to possess .. a certain quantity of free electricity of low tension. 1841 W. FRANCIS (tr. Ohm 1847) in *Taylor's Sci. Mem.* II. 416 (*Ohm's Law*) The force of the current in a galvanic circuit is directly as the sum of all the tensions [*die Summe aller Spannungen*], and inversely as the entire reduced length of the circuit. 1849 NOAD *Electricity* (ed. 3) 135 Tension, Mr. Harris applies to the actual force of a charge to break down any non-conducting or dielectric medium between two terminating electrified planes. 1866 R. M. FENSTON *Electr.* (1870) 64 Tension is the power to polarise and effect discharge. 1871 TYNDALL *Pragm. Sc.* 1879/11. xv. 439 Such machines deliver a large quantity of electricity of low tension. 1873 MAXWELL *Electr. & Mag.* (1881) 1. 39 Finding the phrase *electric tension* used in several vague senses, I have attempted to confine it to the state of stress in the dielectric medium which causes motion of the electrified bodies, and leads when continually augmented to disruptive discharge. 1881 S. P. THOMPSON *Electr. & Mag.* 203 note. The word *tension*.. is so often misapplied in text-books.. The term would be inverted, if we might adopt it to denote only the mechanical stress across a dielectric, due to accumulated charges. 1884 *Nature* 12 Oct. 570/2 M. GARDE breaks free from servitude to the concealed term 'tension', so often misused as a synonym for potential, electro-motive force, and we know not what.

5. high *tension*: a high degree of tension (of any kind); a. esp. in *Electr.*, term for a high degree of electromotive force or difference of potential: now chiefly used by makers of motor-cars, and of magnetic and induction coils. So *low tension*. (See *sense 4*.) Chiefly *attrib.* as in *high* or *low tension systems* (of electric lighting, etc.); also *h. t.* or *L. t.* *charge*, *contact*, *current*, *fuse*, etc. 1833 FARADAY in *Phil. Trans. R. Soc.* CXXIII. 516, I was anxious.. to obtain some idea of the conducting power of ice

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